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This letter goes with R. Smith Review of 316(B) Quarterly (4) Report 11/3/00 and earlier study on thermal effect

Wednesday, November 22, 2000

Ms. Ke Lewis, Project Director
California Energy Commission
Emailed: klewis@energy.state.ca.us

Dear Ms. Lewis,

On November 15, 2000 Heneriette Groot sent two documents to your office by certified mail which review data adequacy in the Morro Bay 'Application For Certification' recently filed by Duke Energy. I authored these papers. She received email conformation that the documents were received and placed on the docket. The need for a cover letter was mentioned in the email and confirmed in our phone conversation today.

The first document is titled "Review of the Morro Bay Power Plant Modernization Project 316(b) and Thermal Effects Study Plants". It contains a review of the first and second 'Study Reports'. The second is titled: "Review of Morro Bay Power Plant 316(b) Study Forth Quarterly Report".

I believe they make a very strong case that (a) claims that the plant will have little or no impact on the Morro Bay Estuary and surrounding Estero Bay are unsupported by the data, (b) instead the data suggest that the plant has had, and will continue to have, serious (catastrophic?) environmental impact, and (c) the plant should be decommissioned. Failing decommission, operations should be stopped during about five months of the year while the bay experiences intense biotic activity or, at the least, intake and outflow systems should be radically modified.

Having read many hundred of pages of the AFC, I am left with a certainty. From the marine impact perspective alone, it was a mistake to build the plant here in 1952. Decisions at all levels should be directed at correcting this mistake as quickly as possible.

I view the CEC and associated agency review process as a perfect opportunity to make Morro Bay a demonstration of restorative action and (perhaps) alternative development. We could start with questions like (a) how can a plant be decommissioned and the owner compensated when siting is inappropriate? (b) Can existing facilities be used to support alternative, environmentally friendly, technologies (i.e., could we use wave, wind, or solar energy in combination with our desal and sewage plants?) (c) Could MB serve as laboratory for multi-agency understanding of environmental impact during a decommissioning process?

We've already formulated many answers to these questions that we'd like to share with your commission under the appropriate circumstances. I'm confident that our city, aroused by the Duke debate, would react to a restorative proposal with great enthusiasm, creativity, and dedication.

Sincerely,

Richard F. Smith, Ph.D. (emailed, signature lacking)

Review of

Morro Bay Power Plant 316(b)

Study Forth Quarterly Report

(Filed as Appendix 6.6a-8 of the Duke Energy Application for Certification, Oct. 2000)

Richard F. Smith, Ph.D. November 3, 2000

Background:

The 316(b) report (hereafter "the Report") prepared for the Central Coast Regional Water Quality Control Board contains the technical studies on which marine environment impact is to be assessed by the California Energy Commission (CEC) in it's decision to grant Duke Energy a certification that will allow the construction of a 1200 megawatt, fossil-fueled, power plant cooled with Morro Bay estuary water.

Until recently the dominant industry in Morro Bay has been inshore fisheries, but with declining stocks and increased regulations, fishing has given way to tourism. The primary attractions are the famous Morro Bay Rock (adjacent to the plant), the beauty and recreational use of the estuary, geographic location (the center of coastal environmental protection and recreation) and the "quaint fishing village" character of the town (about 10,000 residents).

Morro Bay is one of the few remaining estuaries in California and is one of two West Coast estuaries protected by the National Estuary Program. Governor Davis describes the bay as one of California's most precious resources.

But in our review we have learned that the Bay has reduced in size at an alarming rate (accelerating to about 30% loss in the last century) and that there has been an equally alarming decline in the ecological health of the estuary.

Human development causes of estuary deterioration are believed to include pesticide accumulation, agriculture, urban development, and power plant operations. The function of the 316(b) studies is to assure the CEC and its consulting agencies that plant operations make a minimal (or acceptable) contribution to this problem. It follows that the 316(b) report is critically important for CEC approval and should be evaluated with the utmost care.

Prior Review:

In September, a 10-page review of the original 316(b) document and first two quarterly reports was completed. That document is attached and it contains a study by study analysis of data presented by Tenera, Inc., a scientific consultant under contract to Duke Energy. It concludes with the statement: "After carefully reading the Tenera reports, it is my opinion (a) that we do not have a clue about the impact of the power plant upon the estuary, (b) that the proposed studies will not supply such data, and (c) that there is good reason to believe the power plant is disruptive of the estuary ecosystem". Much of the information contained in these documents is repeated in the Fourth Quarterly Report (considered below)

Fourth Quarterly Report:

The format of the following review is changed from the more detailed approach taken before. This is because comments are intended to address the general question of "data adequacy" with respect to marine environmental impacts. However, other reviewers are encouraged to address specific questions about how cited studies are compared, their adequacy, and their relevance to the assessment of marine impact. We have concerns about data omissions (such as August entrainment data), calculations based on erroneous assumptions (such as the Moss Landing source water volume estimations), and inappropriate extrapolations from the raw data (such as 'trying to prove the null hypothesis). The details will be supplied upon request, but were not included because our general conclusions regarding data adequacy are reached in spite of these problems. The approach taken is (a) demonstrate data inadequacy, (b) suggest that impact has and will continue to be unacceptably high, and (c) note a data supported mitigation strategy

Data Inadequacy:

The 316(b) studies neither have nor will answer the question "what is the impact of plant operations on the environmental health of the Morro Bay estuary". Failure to address this question must be considered a critical case of 'data inadequacy'.

This problem is clearly addressed in the section 7.0 of attachment A (Impact Assessment) of appendix 6.6A-2 of the Report. The comments in this short section also apply to the results of appendix 6.6A-3 (Entrainment and Source Water Sampling) especially with respect to species identification failures

involving Blennies which comprise "11.6 % of the total numbers of fishes collected in entrainment samples." 6.6A-3, p 23).

The first paragraph of the "Impact Assessment" section defines the information required to make an assessment. "Assessment of the population impacts of the MBPP's cooling water intake effects logically requires that the fractional losses represented by proportional entrainment [and impingement] or the number of reproductive females or equivalent adults be contrasted to the size of the at-risk resource. The theoretical number of adults that would have survived from larvae lost by entrainment or larger fishes by impingement is compared to the estimated number of individuals in the species population at risk." (Appendix 6.6A-2, attachment A, section 7.0, p7-1).

So, we need to know (1) the number of reproductive females or equivalent adults and (2) the size of the at-risk population of all species.

According to the same paragraph, in order to know this we "must know the rate of harvest (entrainment and impingement), the size of the harvested population (number of larvae at risk to entrainment), and the reproductive capacity of the population including overproduction in compensation of high early life stage mortality." Paraphrased this means that we need to know how many of each species the plant kills, how many are at risk, and the ability of each species to recover from the damage. 316(b) does not and can not provide that information.

The first paragraph on page 7-2 tells us that "To date, we have found that gobies are the most abundant family of larval fishes and unidentified gobies the largest taxa. Impact analysis cannot be performed on these unidentified gobies without knowledge of the species' life histories and demographics." Getting that knowledge is unlikely because (a) the species are unidentified and (b) it says "In general very little information is available on the identifiable entrained species of gobies, such as the bay goby *Lepidigobius lepidus,* blackeye goby *Coryphopterus nicholsi,* and the longjaw mudsucker *Gillichthys mirabilis.*". In summary, the data are inadequate to assess intake impact on the most abundant species sampled. At present, we don't even know the role of these species in estuary ecodynamics (e.g., what is their function in the food chain?).

The situation is similar for other species sampled. Paragraph 3 (p7-1) says "Our impact assessment of MBPP intake effects on entrained organisms will be limited by a general lack of species life history information. The extent and uncertainty of life history information, such as fecundity or life stage

survivorship, about an entrained species takes the form of uncertainty in estimates of the extent of population level changes. Estimates of the extent of any entrainment impacts on resource populations are further limited by the quality and quantity of information available on taxa populations or harvested stocks. Both of the factors- species-specific life history and demographic information- contribute to the overall uncertainty in our estimates of long-term population trends."

Nevertheless, the author says that forecasts will be attempted on "Other remaining species of the most abundant larvae collect so far, such as Pacific staghorn sculpin, northern lampfish, and blackeye goby" even though they "will present information gaps". (p7-2, paragraph 1). The information gaps involve assumptions necessary to apply mathematical models. Again, the data are inadequate to provide reliable information about the impact on these remaining species.

I should like to add an important point. If we don't know the life history and demography of these species we can't begin to understand the role they play in the ecosystem. Furthermore, we have no information of the *indirect* impact on these (or other) species because we have no idea how their food resources are destroyed by water diversion. But it seems likely the impact is high because the unidentified species tend to be tiny and located nearer the base of the food chain. This also makes them most vulnerable to entrainment.

Adverse Impact:

Careful analysis of the impact models proposed by Duke (including data from the completed Moss Landing 316(b) report) suggests the proposed plant will be responsible for kill-rates at least three times higher than those responsible for the multimillion dollar mitigation settlement at Moss Landing. Details of the analysis are technical and will be supplied under separate cover by Thomas Laurie. A general description of the problem follows.

Tenera says that the new Moss Landing project will add 13% to the existing loss due to entrainment of sampled species. These figures are obtained for each entrained and identified species by multiplying the number of entrained individuals by average survival to adulthood and dividing this by the estimated size of the population at risk (p5-6 of appendix 6.6A-1). The estimated size of the at-risk population is arrived at by multiplying the volume of source water by the number of each species in a standard sample.

Thus, the predicted entrainment rate for each species is a function of source water volume estimates. If the volume of source water is high, the expected loss rates will be relatively low.

We believe that the 316(b) study plan will overestimate source water volume by more than a factor of three. Furthermore, we believe this miscalculation resulted in the Moss Landing kill projection of 13% when it should be over 40%. The reader is reminded, however, that even attempting such an estimation was unwarranted from data presented (as noted in the data inadequacy section above).

The probable impact of these numbers is made unmeasurably large by failure to consider a) cumulative effects of existing plant operations, (b) sample eggs and sub-larva sized organisms that comprise lower levels of the food chain, (c) indirect effects due to factors such as food loss and ecological imbalance, (d) ecodynamics (species function), (e) effects of 30% habitat loss due to siltation, and (f) poor ecological health (high mortality imposed on population decline resulting from factors such as pollution, agriculture, and human development.

It is worth reminding the reader that near the end of October 2000 Governor Davis signed the Comprehensive Conservation Management Plan for the Morro Bay Estuary. In his letter transmitting the plan to the EPA, he said that the CCMP " represents much hard work by a very wide range of interests, all aimed at protecting one of the State's most valuable natural resources, the Morro Bay estuary." It seems clear that the proposed project and its unestimatable impacts are not in keeping with this plan nor can dollars mitigate the loss.

Mitigation

As noted above, it seems clear that the data are inadequate to assess the extent of cool-water intake on estuary ecodynamics, but they do suggest that the impact will be substantial. Real mitigation requires that the use of estuary water be discontinued. However, the Report does contain information suggesting that the effects of entrainment and impingement would be significantly reduced by limiting plant operations to September or October until February and from March to May.

Appendix 6.6A-2 (Impingement) provides the sample data from 9/10/99 to 7/10/00 (8/10/2000 appears on graph coordinates but no data are plotted). The graphic distributions of impinged fishes begins in subsection 2.0 (Results). Virtually all topsmelt were sampled in February. Nearly all

Northern anchovy were found in June (p25-26). Pacific staghorn sculpin kills were more varied, but most were obtained in May, June, and July. Nearly all of the plainfin midshipman was sampled in May and June. Thus, almost all fish killed would have been excluded if the plant were inoperable in February, May, and June.

Of the Macroinvetebrates reported (starting section 2.3, p34), the Brown rock crab was impinged through out the year, but the greatest biomass was reported in June and July. The Hairy rock crab was broadly distributed; Black-tailed Bay Shrimp were most frequently impinged in May. All market squid were impinged in June. Penaeid Shrimp were more distributed but mostly obtained in December and January while Xantus' Swimming Crabs were found from September to February. The purple sea urchin and the kelp crab were more evenly distributed through the year. So, plant shutdown during the summer would save many Brown rock crab, Black-tailed Bay Shrimp, and Market squid as well as the fishes noted above.

It is unfortunate that we have not seen the August data, but observation of the bay suggests that samples will peak during this month as well. Further, the bay was filled with jellyfish in June 2000 and these creatures must have experienced massive impingement at that time (but they are not reported).

Therefore, should the project go forward in spite of environmental impacts, operations should be discontinued during the summer period of high biological activity. This is especially true because the lost resources form the food base for many other species including brown pelicans, cormorants, and sea lions that abound in the bay during this period.

Summary:

The environment impact studies are inadequate. The 316(b) data neither do nor can estimate environmental impact on the species sampled. This is because fractional losses cannot be accurately estimated and because the indirect impact of even inaccurately estimated losses on unsampled species will not be studied. To do so would require a badly needed, but long-term study, of existing ecodynamics and a clear picture of estuary health with which to compare current conditions.

The evidence does suggest, however, that water diversion has had and will continue to have serious, perhaps catastrophic, impacts on estuary health.

This damage is exacerbated by alarming declines in estuary size and health.